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FEEDING HABITS AND BEHAVIOURAL STUDY OF BLACK DRONGO (*DICRURUS MACROCERCUS*) IN LUMDING, ASSAM

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ABSTRACT

The Black Drongo, a beautiful insectivorous forked tail black bird with many interesting and extraordinary features is evenly distributed in various parts of the Indian subcontinent. It is invariably seen probing into the blossoms of silk cotton, flame of the forest and coral trees for the sugary nectar they exude. It has many contributions to the ecosystem. Lumding forest area was selected as a site for survey as Lumding is considered not only as an ecologically rich place but also negligible work has been reported about Black Drongo and its livelihood from this piece of nature. The study was conducted from January, 2011 to December, 2020 where data was recorded on monthly basis. The feeding habit of Black Drongo (Dicrurus macrocercus) was studied which revealed that grasshopper, beetle, moth, honey bee, molluscs, spider, dragonflies, ants and other insects come under regular consumption of the bird. Simultaneously, the perching habit of Black Drongo was also kept under observation where the highest perching was recorded in electric wires and the least perching was observed at ground level. Preferable trees for perching were recorded as Mangifera indica, Psidium guajava, Shorea robusta. Maximum perching height was marked as 12m whereas minimum perching height was 10m approx. Climatic changes were found remarkably effective not only on feeding habits but also on perching prior to which least perching was observed during March to August in different perching sites like electric wires, cable wires, trees and ground level.

KEYWORDS: Black Drongo, Feeding Habit & North Eastern Birds

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Original Article

1. INTRODUCTION

The Black Drongo (*Dicrurus macrocercus;* Family-Dicruridae) is an insectivorous Asian passerine resident breeder bird found in India, Bangladesh, Sri Lanka east, China, Indonesia, Japan, etc. as reported by IUCN (Vieillot,1817). In India, it is distributed in Gujarat, West Bengal, Madhya Pradesh, Odisha, Maharashtra, Telengana, Andhra Pradesh, Goa, Kerala, etc. The subspecies *Dicrurus macrocercus* is mostly visible in Nepal, Bhutan, Bangladesh, Northeast India. The bird has a black body with a well known forked tail (Ali, 2010). It normally doesn't occur in forests. Their habitats mostly include dry grasslands, moist and dry shrublands. Black Drongo is well known for its aggressive behaviour towards other birds like crow, which earns it the informal name of king crow. Mariappan *et al.* (2013) reported that drongo mostly hunts its food from agricultural fields. This bird has been reported to feed mainly on insects like grasshoppers, termites, wasps, bees, ants, moths, locusts, cicadas, beetles, dragonflies as their primary food. Black Drongo are seen on ploughed fields picking up exposed caterpillars. Some have been seen feeding on fish occasionally. The Drongo also feed on milkweed butterflies and insects which are attracted by artificial lights. They follow cattle in pastures to catch the flushed out insects and also follow the plough to pick exposed ground dwelling insects and their larva. Drongo occasionally have been reported to feed on small vertebrates. Though they are welcomed by farmers as hunters of agricultural pest insects

but bee-keepers consider them as nuisance for preying on honey bees. By eating the plant nectar they have been found to help in pollination also.

Such reports triggered us to explore the feeding habits and other behavioural aspects of Black Drongo based on which we designed our experiment in Lumding Reserve Forest area from 2010 to 2020. During the current study, we tried to investigate the various behavioural aspects of Black Drongo like its feeding habit, perching behaviour, etc. Effort was also given to identify whether there exists any effect of temperature variation of Lumding on the behavioural aspects and life style of Drongo.

Figure 1: Black Drongo.

2. STUDY SITE

Lumding is located in the geological location of 25°75' N and longitude 93°17' E. The climate is tropical mesothermal with high humidity. The temperature ranges from 4-5° in winter & 26° to 40°C in summer. The average annual precipitation 448.79 inches with relative humidity of 85%.

The climate of Lumding is characterised by excessive moisture in air and rise in temperature is checked by frequent showers and thunderstorms. The climate is semiarid. The principal type of forest found in Lumding is degraded moist deciduous forest whereas Lumding also witnesses tropical rainforest. Lumding Reserve Forest is a compact large block of forest measuring 252.9 sq. Km and comparatively has less human disturbance. Lumding gives shelter to a large variety of faunal species. As the forest area of neighbouring Karbi Anglong district are affected by shifting cultivation, the herds of Asiatic Elephants take shelter in Lumding Reserved Forests increasing the biological valuation of this area.

3. METHODOLOGY

As Lumding is not densely populated with Black Drongo, hence around 100 birds of the selected variety were observed during the survey in Lumding. The survey was conducted for a prolonged period of ten years (2011-2020) to get authentic

reports as well as to avoid statistical errors. The experiment continued from January to December each year and data was recorded on monthly basis. Observation was recorded with naked eye as well as by using specialised binoculars (Ali, 2002). Observation of feeding and perching was done twice a day once from early morning 5.00 am to 7.30 am and again in same day evening from 4.30 pm to 5.30 pm or upto 5.45 pm. Stick method was used for measuring perching height (Hairiah *et al.,* 2001). Data was recorded for 15 minutes at each selected site. Observation was made in direct mode for identification of insects which were consumed by Black Drongo without disturbing the bird. Feeding habit was analysed followed by the protocol of Dinsmore, 1973; Rajashekara S. and Venkatesha, 2014; Kour and Sahi, 2012.

4. STATISTICAL ANALYSIS

For analysing the significant differences among data of perching site as well as perching height used by Black Drongo among selected locations (Kaur and Kler, 2018), Students t- test was carried out. Data obtained were represented as Mean±S.E. Results were represented in tabular forms (Sidra *et al.,* 2013)

5. RESULTS

Table 1: Recorded Average Temperature Level of Lumding Area

Temperature (In Centigrade Scale)												
Year	**Jan**	**Feb**	**Mar**	**April**	**May**	**June**	**July**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
2011	7.0	8.0	22.0	29.0	32.0	34.0	34.0	34.1	35.1	32.2	28.6	17.8
2012	7.2	8.3	22.0	29.0	32.8	34.2	34.2	34.0	24.9	32.1	29.4	18.7
2013	7.3	8.5	23.0	29.0	32.6	34.6	34.3	34.4	35.2	33.2	30.2	18.5
2014	7.4	8.7	23.5	29.4	32.7	34.7	34.4	34.2	34.7	31.9	30.9	20.8
2015	7.5	8.8	24.0	29.7	32.8	35.0	35.7	35.3	34.3	33.3	29.8	16.6
2016	7.7	8.9	25.0	29.9	33.9	35.2	36.7	35.9	36.1	32.7	30.5	21.7
2017	7.9	9.1	26.0	30.3	34.0	35.5	37.0	36.5	35.8	33.6	29.0	19.9
2018	8.0	9.2	26.5	30.6	34.6	35.8	37.0	36.9	36.1	35.5	29.5	19.4
2019	8.2	9.3	28.0	30.7	34.8	36.0	37.2	37.0	37.2	35.1	29.5	18.1
2020	9.0	9.5	28.2	31.2	35.0	36.2	37.2	37.0	37.3	35.4	29.0	17.6

Table 2: Animal Species Consumed by Black Drongo

Name of Animal	Scientific Name	Family	Mode of Feeding
Grasshopper	*Hieroglyphus daganensis*	Grasshopper	Aerial Feeding
Honey bee	*Apis sp.*	Aphidae	
Dragonfly	*Anisoptera sp.*	Petalurdae	
Beetle	*Orcytes boas*	Scarabaeid	
Moth	*Gynnidomorpha alisman*	Sphingidae	
Lizard	*Sphaerodactylus ariasae*	Sphaerodactylidae	Ground Feeding
Spider	*Steatoda triangulosa*	Theridiidae	
Ant	*Camponotus pennsylvanicus*	Formicidae	
Termite	*Macrotermes bellicosus*	Termitidae	
Mollusca	*Alasmidonta marginata*	Unionidae	

Table 3: Feeding Habits of Black Drongo Recorded from 2011-2020

Year	Jan	Feb	March	April	May	June	July	Aug	Sep	Oct	Nov	Dec
2011	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Grass Hopper bees	Insect Insect Larva Beetles	Insect Insect Larva
2012	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Grass Hopper bees	Insect Insect Larva Beetles	Insect Insect Larva
2013	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Grass Hopper termites	Insect Insect Larva Beetles	Insect Small Lizard,
2014	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Mollusca termites	Insect Insect Larva Beetles	Insect Insect Larva
2015	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Grass hopper bees	Insect Insect Larva Beetles	Insect Small Lizard,
2016	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Grass hopper teermites	Insect Insect Larva Beetles	Insect Small Lizard,
2017	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Mollusca Bees	Insect Insect Larva Beetles	Insect Insect Larva
2018	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Mollusca bees	Insect Insect Larva Beetles	Insect Insect Larva
2019	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Mollusca Bees	Insect Insect Larva Beetles	Insect Small Lizard,
2020	Insect Insect Larva	Insect Insect Larva	Insect Insect Larva Small Lizard, Mollusca (Increasing in rate)	Insect Insect Larva Grass hopper Beetles Ants moths	Insect Insect Larva Mollusca	Insect Insect Larva Mollusca	Insect Insect Larva Small Lizard, Mollusca (Decreasing in rate)	Insect Insect Larva Small Lizard, Mollusca Beetles	Insect Insect Larva ants moths	Insect Insect Larva Grass Hopper termites	Insect Insect Larva Beetles	Insect Small Lizard,

Table 4: Perching Sites used by Black Drongo

Perching Sites				
Months	**Electric wires (Mean±SE)**	**Cable Wires (Mean±SE)**	**Trees (Mean±SE)**	**Ground Level (Mean±SE)**
JAN	3.01±0.36	2.23±0.21	1.95±0.24	1.95±0.23
FEB	3.79±0.43	2.90±0.27	1.86±0.21	0.93±0.21
MAR	2.96±0.29	2.76±0.21	0.27±0.18	1.04±0.17
APR	1.71±0.19	1.45±0.17	0.34±0.19	0.48±0.14
MAY	1.68±0.18	2.02±0.20	0.69±0.15	0.51±0.17
JUNE	1.12±0.17	1.47±0.18	0.98±0.17	0±0.008
JULY	1.27±0.16	1.28±0.15	0.61±0.15	0±0.004
AUG	2.08±0.25	1.96±0.22	0.63±0.16	0.41±0.16
SEP	2.95±0.28	2.06±0.18	0.88±0.14	1.09±0.16
OCT	3.13±0.32	2.77±0.23	1.97±0.27	1.03±0.15
NOV	2.94±0.26	2.91±0.24	1.56±0.22	1.82±0.21
DEC	3.77±0.42	2.73±0.22	1.74±0.23	1.33±0.18

Table 5: Perching Height of Black Drongo

Months	Perching Height		
	Electric Wires (in mtrs) (Mean±SE)	**Cable Wires (in mtrs) (Mean±SE)**	**Trees (in mtrs) (Mean±SE)**
JAN	11.02±0.22	11.86±0.31	10.88±0.43
FEB	11.03±0.21	11.64±-.32	10.39±0.51
MAR	11.23±0.24	12.06±0.36	10.45±0.24
APR	11.25±0.23	12.08±0.32	10.83±0.53
MAY	11.34±0.26	12.15±0.26	11.82±0.52
JUNE	12.04±0.20	11.83±0.41	11.44±0.56
JULY	11.95±0.26	11.82±0.52	11.09±0.42
AUG	11.64±0.23	12.38±0.38	11.21±0.26
SEP	11.09±0.21	12.03±0.26	11.82±0.23
OCT	11.08±0.34	12.01±0.27	11.12±0.22
NOV	11.54±0.23	12.05±0.25	10.46±0.21
DEC	11.03±0.20	11.71±0.23	11.64±0.44

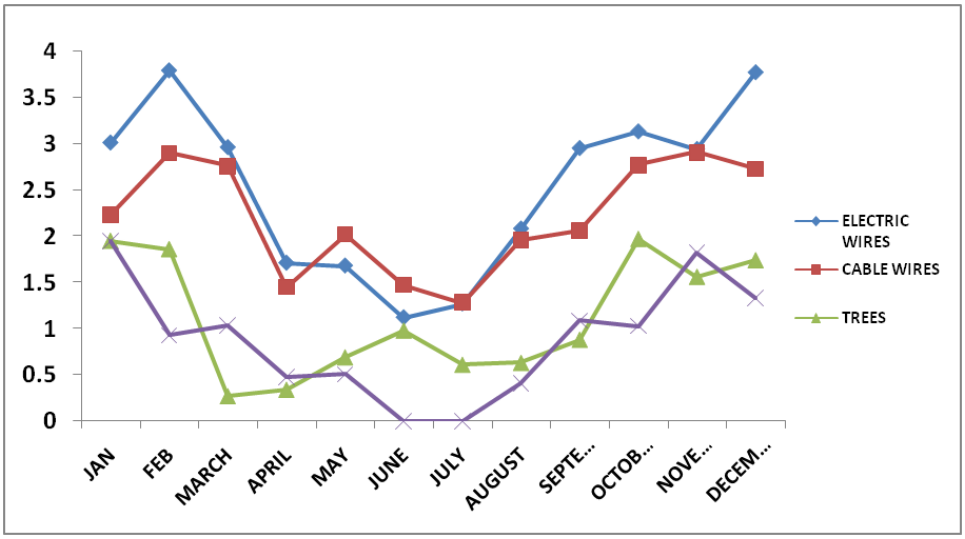

Figure 2: Graphical Representation of Perching Sites used by Black Drongo.

6. DISCUSSION

Black Drongo are monogamous and are highly territorial. They have been reported to defend their breeding territory aggressively. Impact of climatic change in various Taxa has been discussed below,

In case of Butterflies

In the case of butterflies, rise in temperature causes less nectar production and upward shifting of population. Climatic change has significant and measurable impact on various taxa such as vegetation, soil, arthropodes, butterflies, reptiles, birds and mammals.

In case of Amphibia-

Amphibia are good bioindicators. They have dual mode of life (Kour and Sahi, 2012) Amphibians viz. Water balance, thermoregulation and hermonal regulation of reproduction.

In case of Reptiles-

In the case of reptiles, the animals with increase in temperature, tends to migrate towards higher elevation leading to upward migration eg. Cobra (*Naja kaouthia*) as a tropical species occurs mostly below 1000m found at 1700 mtrs in West Sikkim (Ghani & Maalik, 2020).

Reproduction and development has a direct link with temperature. Temperature determines the sexes in most reptiles (Sidra *et al*., 2013). Deviation of sex ratio from normal due to global warming can disrupt population dynamics.

They feed on insects, larva, pila, acartina, small lizards from which they get their food rich in lipid. Black Drongos breed mainly in February and March in Southern India, and until August in other parts of the country. Males and females sing in the morning during the breeding season. Courtship can include aerobatic chases and they may lock their wings and breaks together, with the pair sometimes falling to the ground. The usual clutch is three or rarely four eggs laid in a cup nest placed in the fork of an outer branch of tree (Anthal and Sahi,2013). The eggs are incubated by both parents and hatched after 14-15 days. Nestlings are brooded for the first five days, after which the young are capable of maintaining a fairly constant body temperature.

Warmer temperature and changed climate patterns may alter birds reproductive strategies. Many tropical birds species might shift their breeding periods. Due to climatic change, Black Drongo was reported to breed last part of January their April May.

A change in the behavioural pattern particularly that of the breeding activity of Black Drongo was observed at Lumding area from January 2010. In our observation meteorological data was meticulously noted. Data collected from 2010 to 2020 i.e., during the last ten years showed a gradual rise in temperature, rainfall, humidity and food availability of Black Drongo in last week of January to early March and appreciable fall of the said parameters during May- June-July which is actually the breeding season of these birds. In 2012, we first noticed the bird (2 pairs) collecting nesting materials and constructing the nest, rest part is they lay eggs and hatching was successfully done giving rise to three nestlings. They gradually grew up and in one nest the youngs became enough self-sufficient by 2nd week and in the other nest, they became adult by the 3rd week. On the other hand, the most interesting thing that happened during May-June and July was that temperature, rainfall, humidity and food was found to be on a decline note. There was a tremendous correlation found from these meteorological data. Since, in January, the temperature, rainfall, humidity was on the rise, there was a hormonal

triggering of gonado tropic hormone which induced the birds to breed early and at the same time due to the said parameters insects, amphibians, lizards which forms the food of Black Drongo was available. On the other side, there was a sharp decrease in meteorological factors, though the birds prepared nest and breed in lesser number but interestingly the survival success was very high. In the case of January-March breeding, the survival success rate was so high, the reason behind which may be investigated now. But one thing can be admitted with certainty that it is climate change so to say global warming which is playing the major role.

Apart from the comparative study of the feeding habit and various behavioural aspects with temperature variation, the study was conducted on one more parameter that is the perching habit of Black Drongo in Lumding forest area. Though the species has records to prefer open areas like farmlands, grasslands, forests, fields, etc., now it has records of perching in electrical poles and phone wires. In our survey, we obtained perching of drongo in forest areas, open fields as well as electrical poles, cable wires ann telephone wires, etc. The bird has been observed to wait over there observing aerial displays and catching insects during both day as well as night.

Perching Behaviour Data

Results revealed that during early morning Black Drongo perches in solitary mode whereas during the evening it perches in groups. Whereas during feeding they perched both solitary as well as in groups. The maximum perching height was recorded as 12m whereas, minimum perching height utilized was 10m. The perching height used might be due to the availability of food resources or vegetation. Highest frequency of perching was observed in electric wires and cable wires. Similar findings were recorded by Kaur and Kler (2018).

The perching behaviour of birds with habitats and availability of prey (Racher and Davis, 1998). It can be concluded by saying that many factors like season, temperature, breeding, prey-predator interaction, might be effective over perching. In previous research it has already been reported that weather, especially temperature affects the perching behaiour of insectivorous birds (Kelly,1998). Studies of Gokula and Vijayan,2007 and Asokan, 2010 stated that habitat, inter-specific relationship, availability of food are responsible for variation in perching.

Figure 3: Black Drongo.

7. CONCLUSION

Black Drongo, attracts everyone's attention with its graceful shape and fearless attitude. There is enough left to discover about the behaviour aspects as well as the feeding habits of Black Drongo in Lumding. We are happy that our work lead out with remarkable results and increased our desire to search more on it. Hence, we are optimistic to investigate more on it from other dimensions in near future.

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